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Three-Dimensional Multilayer Graphene-Fe_2O_3 Foam Composites and Their Application in Energy Storage

The use of electrochemistry for the preparation of graphene and its derivatives has been intensively studied over the past decade. [1-4] In this work, we demonstrate a unique strategy for the fabrication of multilayer nano-porous iron oxide and graphene structure on three-dimensional graphene foam (GF). The combination of Fe_2O_3 and GF takes the advantage of the high energy storage capacity of the former and the good conductivity of the former structure. Precise control of the Fe_2O_3 mass loading was achieved by an electrodeposition approach, which produced nano-wall arrays. The favorable attraction of electrochemically exfoliated graphene oxide (EGO) to Fe_2O_3 facilitates the uniform coating of EGO on the surface of iron oxide. Alternating multilayer structures of EGO and Fe_2O_3 were realized thanks to the unique properties of EGO as both a spacer and current collector (figure 1). The composite could be used directly as a binder-free anode in Li-ion batteries, demonstrating the viability of this approach for high yield and scalable production of graphene/metal oxide composites.

References

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Figures

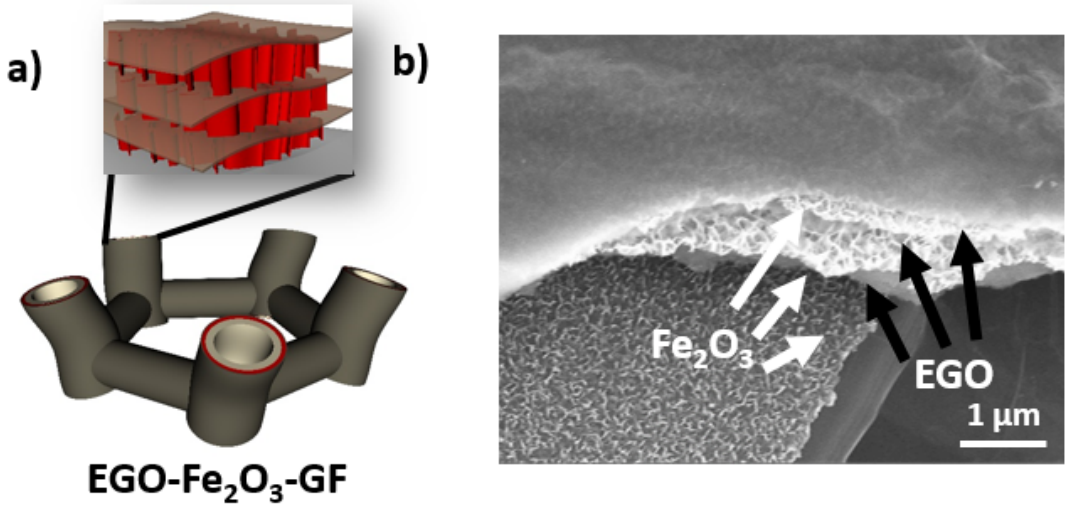

Figure 1: a) Schematic illustration of the multilayer EGO-Fe_2O_3-GF architecture; b) SEM image of the corresponding EGO-Fe_2O_3-GF sample